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WELCOME ABOARD THE USC&GSS EXPLORER

U.S. DEPARTMENT OF COMMERCE

ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION / U.S. COAST & GEODETIC SURVEY

1965

TO: Visitors aboard the Ship EXPLORER

The Coast & Geodetic Survey of the Environmental Science Services Administration, an agency of the U. S. Department of Commerce is proud of its responsibility to map the coast line of the United States and explore the seas. We are happy at your opportunity to tour one of our larger oceanographic survey ships, the EXPLORER, and learn more about her scientific endeavors.

The sea can be a most gracious friend and protector to those who understand and love her. The great concerted effort by men to fathom the depths of the sea and learn more and more of her environs will enable mankind to benefit from her untold and hidden resources. The work of this ship is another step in achieving a more thorough understanding of the sea and the utilization of her immense natural resources.

On behalf of the Secretary of Commerce, I am pleased to present you with this informative brochure so that you might better understand the Coast & Geodetic Survey.

Director
Coast & Geodetic Survey

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THE SHIP

The EXPLORER which you are visiting today was commissioned October 14, 1939 at Lake Washington Shipyards in Houghton, Wash. The original cost of the ship was $1,250,000.

Since then the ship has compiled an outstanding record of service in the Coast & Geodetic Survey. Prior to World War II, she made hydrographic surveys off the Aleutian Islands in Western Alaska. During the war, the EXPLORER participated in hydrographic surveys in the South Pacific in support of U. S. military maneuvers. At the end of the war, the ship returned to her home port of Seattle, Wash. With that city as a base, the ship worked in Hawaiian waters during the winter and spring and in Alaskan waters during the summer and fall.

In 1960, the EXPLORER's home port was transferred to Norfolk, Va., after the ship completed a 9,000-mile cruise from Seattle via San Diego, the Panama Canal, Great Swan Island and Key West, Fla. Since her transfer to the Atlantic Coast, the EXPLORER has worked in waters surrounding Portland, Maine, Nantucket Sound; Dakar and Freetown, Africa; Recife, Brazil; Cape Hatteras, North Carolina; and Brest, France.

The EXPLORER is one of four Class I vessels operated by the Coast & Geodetic Survey. The ship's physical characteristics are as follows: Length 219.6 feet; width 38.0 feet; draft 15.0 feet; displacement 1900 tons (fully loaded); cruising speed 12.5 knots; top speed 13.5 knots; range 3,750 miles, endurance 12.5 days.

The ship is powered by steam turbines with a fixed blade screw developing 2,000 horsepower. Fuel consumption is 5,400 gallons per day at 12.5 knots. The evaporator can distill 4,000 gallons of water per day in calm weather. Total fresh water capacity is 38,000 gallons.

The EXPLORER normally is manned by 14 USC&GS Commissioned Officers, one U. S. Public Health Service Physician, one chief marine engineer, and 73 crew. The USC & GS commissioned officers are graduates of accredited technical colleges in the United States. The officers supervise the scientific studies as well as manage the ship. The crewmen operate and maintain the electronic equipment, assist in processing the field records, maintain the ship's engines and equipment, and prepare the meals for ship personnel.

THE COAST AND GEODETIC SURVEY

The Coast & Geodetic Survey, the oldest technical agency in the United States Government, is also the nation's oldest scientific body. Since its inception February 10, 1807, under Thomas Jefferson's administration, this federal agency has served mariners, engineers, aviators and scientists.

The Coast & Geodetic Survey's initial responsibility was to survey and chart the coasts of the original 13 states. Much of the Coast Survey's success in this work can be attributed to Ferdinand Hassler, the agency's first director. Initially, he received severe criticism from the public and members of Congress, who did not understand the science of surveying. However, through his undaunted and persistent emphasis on pinpoint accuracy, the Coast & Geodetic Survey achieved worldwide recognition for the precision of its charts. Today, the bureau distributes annually approximately two million nautical charts to mariners.

The surveys of the coast, as inaugurated and developed by Hassler, were so successful that Congress ultimately extended the Bureau's work to the interior of the United States. The agency's scientists and engineers were charged with the responsibility to establish, with pinpoint accuracy and control, reference marks on which local surveying and topographic mapping might be based during future years. Today, more than 425,000 triangulation and level marks cover the country's surface.

Triangulation stations provide the exact latitude and longitude of a given point, while bench marks record the height above mean sea level. These survey monuments may be found in desert valleys, on barren mountain peaks, and in frozen wastes of the far north. Many of them attest to the skill, courage and endurance of the men who placed them with mathematical precision in appointed spots. Each successive decade has seen a broadening of Coast & Geodetic Survey operations with improved equipment and techniques. Oceanography represents one of these new fields of endeavor for the Bureau.

Oceanography treats of the physical nature of the sea and its floor, the chemistry of the water's composition, the phenomena of its tides and currents, and the nature of its plant and animal

life. The oceans cover 71% of the earth's surface and have frequently been called the "Last Frontier". The Bureau's fleet makes oceanographic surveys to give the United States more knowledge as to how the sea's vast resources might be used for the betterment of mankind. From its studies of the sea, the Coast & Geodetic Survey publishes Tide and Current Tables by processing information gathered from tide gauges in a tide prediction machine. Nautical charts are published for the mariner under six main groupings: sailing, general, coast, harbor, intracoastal waterway, and small craft.

In support of its hydrographic surveys, the Coast & Geodetic Survey utilizes aerial photogrammetry. Aerial photographs provide a perspective view of shorelines and furnish a very accurate method for establishing the coastline on a nautical chart. Aerial photogrammetry has also been employed to detect movement in the earth's crust.

A new satellite tracking system for use in satellite triangulation and related geodetic research has recently been developed. High altitude satellites are used as beacons and photographed against a star background to develop a network of spatial triangulation. Using this optical method of tracking, the configuration of the earth's surface might ultimately be determined to an accuracy of one part in more than one million.

Seismic stations are maintained by the Coast & Geodetic Survey to detect the epicenter, or point of origin, of an earthquake and its magnitude. In the Pacific Ocean, a seismic sea wave warning system provides coastal residents with advance knowledge of tsunamis, or seismic tidal waves, thereby averting many deaths and much property damage. The earth's magnetic field is studied from measurements made at permanent laboratories in the United States, by mobile land parties, and from ships at sea. Knowledge of the earth's magnetic field is essential to mariner, aviator, and land surveyor.

Gravimetric surveys are made to determine the magnitude of gravity at various points in the United States. From these surveys information is obtained by geodesists, who are interested in a more accurate configuration of the earth.

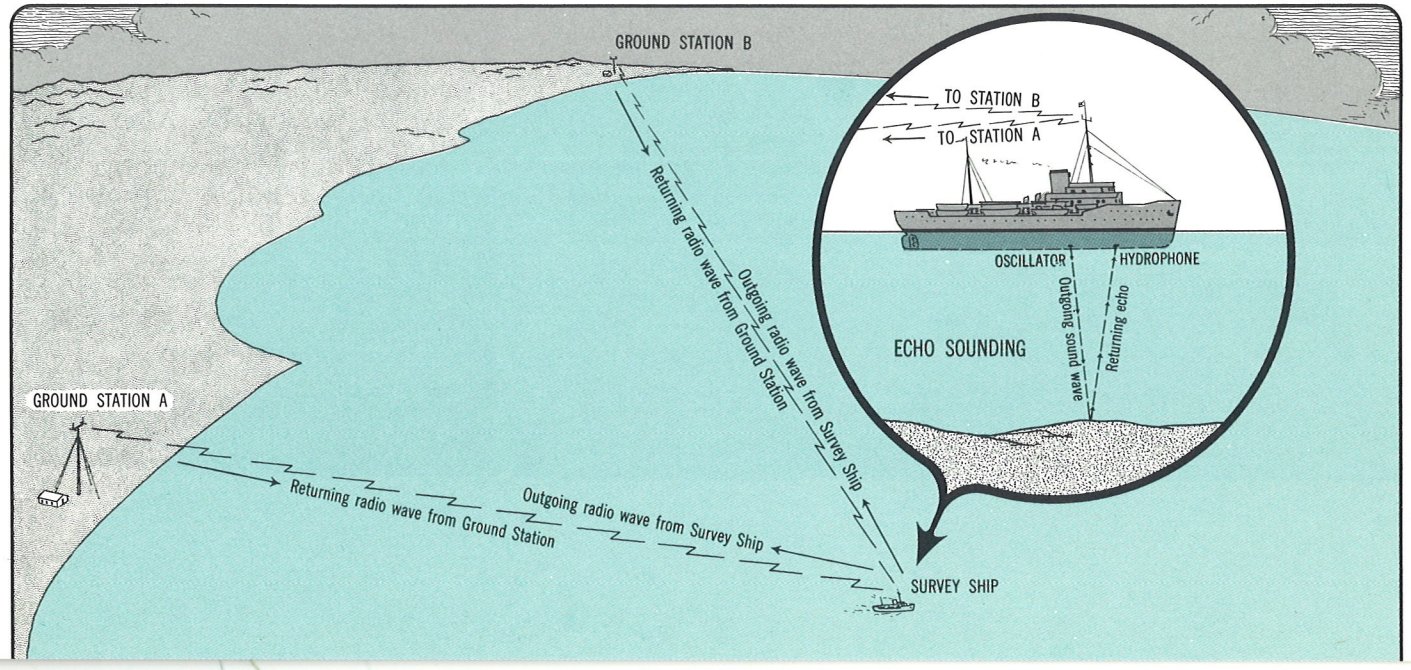
Each year the Coast & Geodetic Survey publishes aeronautical charts. These charts are beneficial to the aviator who is interested in obstructions and clearances around airports as he attempts to take off or land his aircraft. Further information on the Bureau's activities may be obtained by writing the Director, Coast & Geodetic Survey, Washington Science Center, Rockville, Md., 20852.

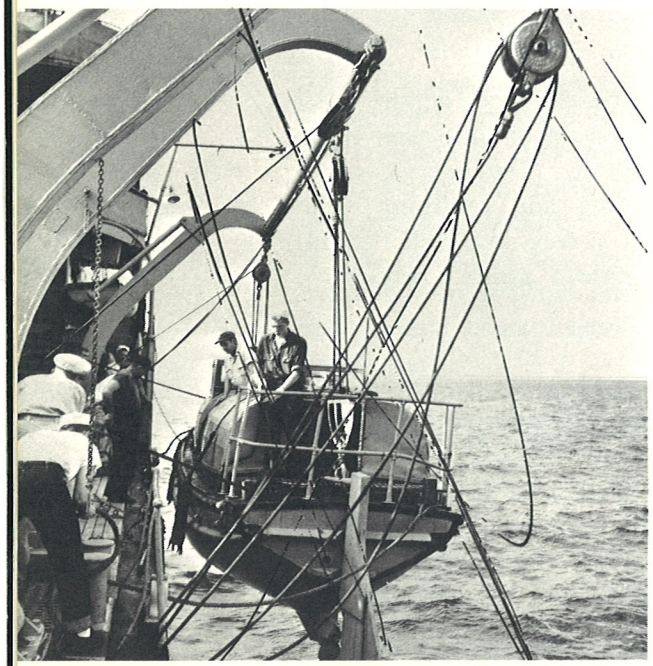
OBSERVATIONS AT SEA

The illustrations that follow show some of the techniques we use to gather scientific data from the sea. The photographs were made aboard the EXPLORER or a sister ship in the C&GS "white fleet."

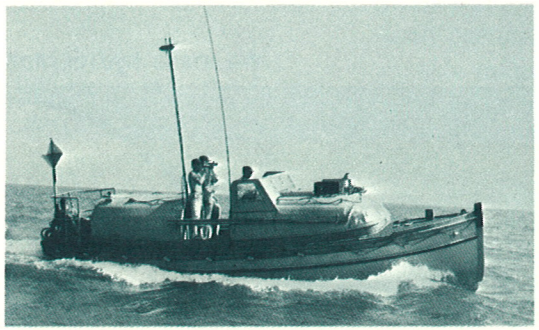
While the ship's fathometer measures the depths under the vessel by sound, the position of the vessel is determined by electronic methods. The interval which elapses between the outgoing and returning radio signals is measured on the survey ship and the distance determined to the known ground stations.

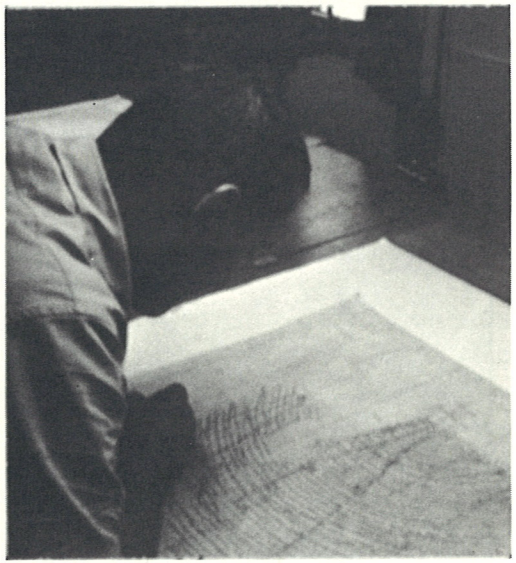
We make hydrographic surveys for nautical charts





In shallow water we use launches to make hydrographic surveys.

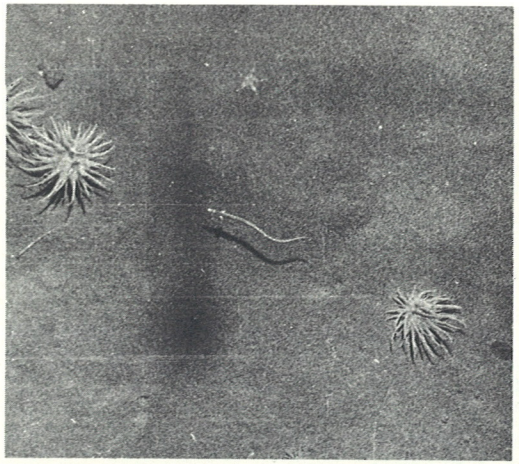


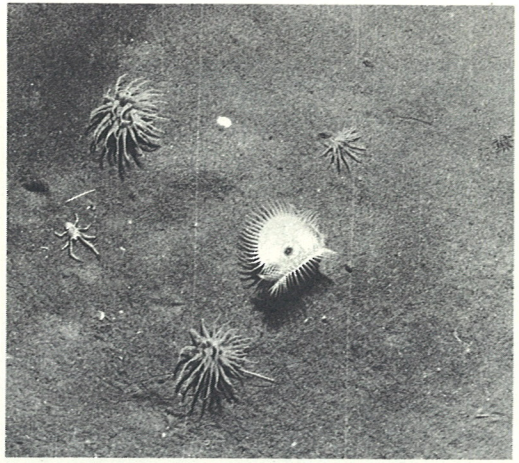


Lowering a launch from the mother ship.

The launch at work.

Plotting soundings and drawing contour curves on the boat sheet at the end of the day.

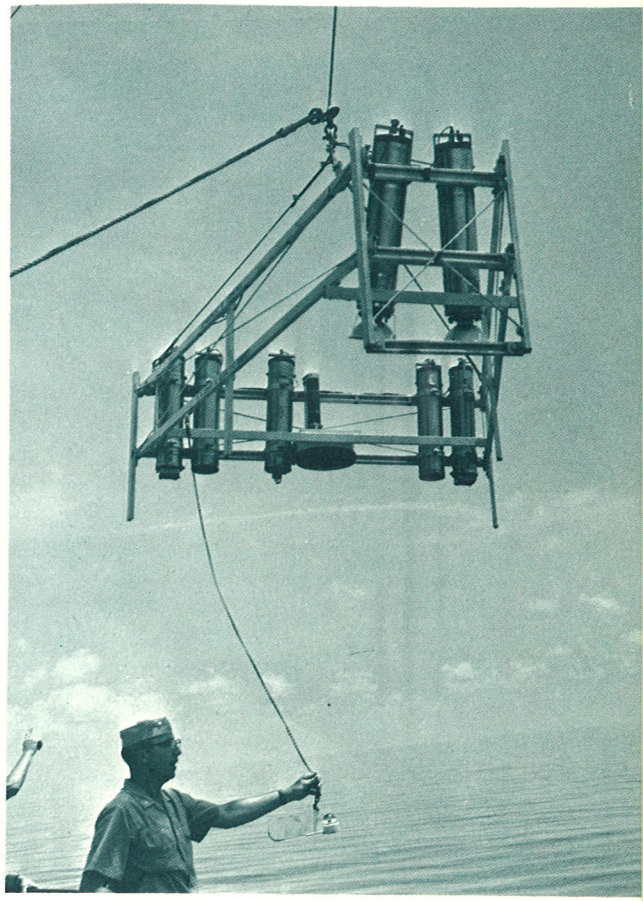




We photograph the bottom of the sea.

Pictures taken at the bottom of the sea.

A deep sea camera being lowered into the water.

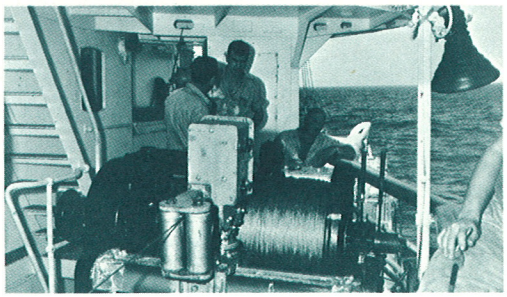


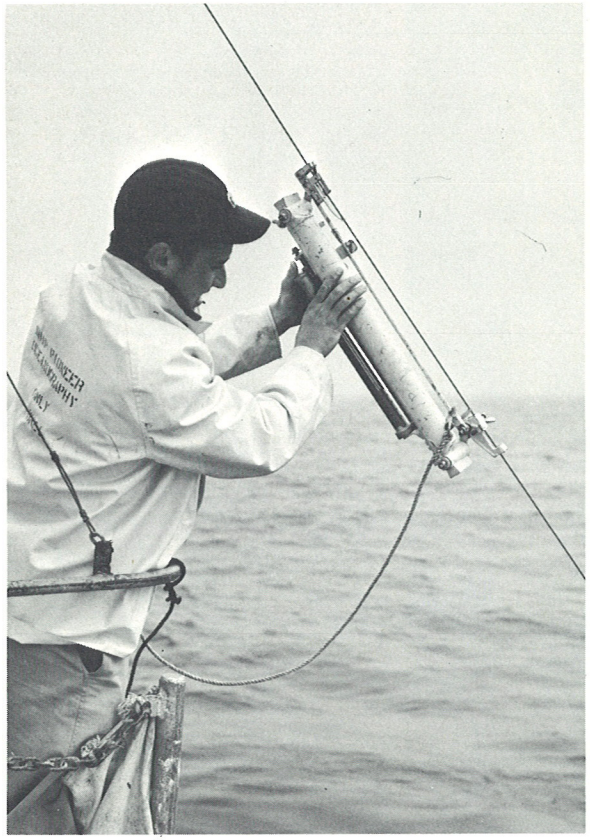
We gather bottom samples to study geological characteristics of the ocean bottom.

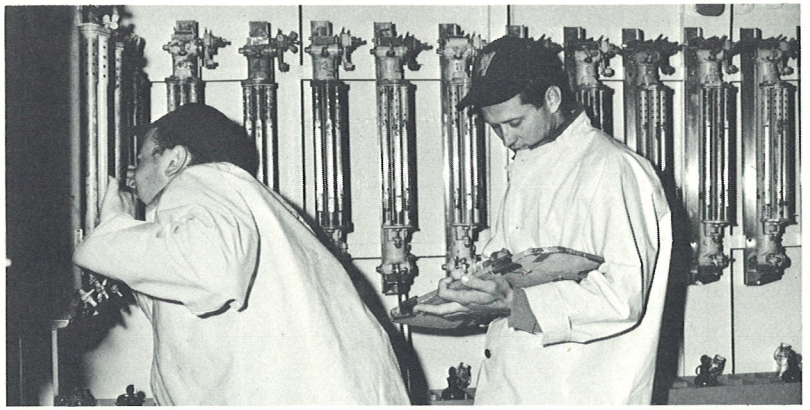
Preparing to place a bottom sampler overboard.

Analyzing the material after retrieving the bottom sampler.

Operating the winch to obtain a bottom sample.







The water temperature being read from a precision thermometer attached to a Nansen bottle.

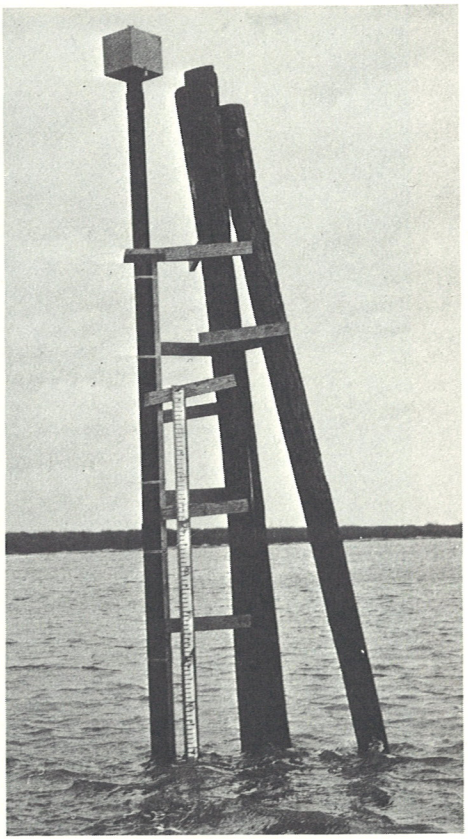
We obtain the temperature of the water and analyze the samples.

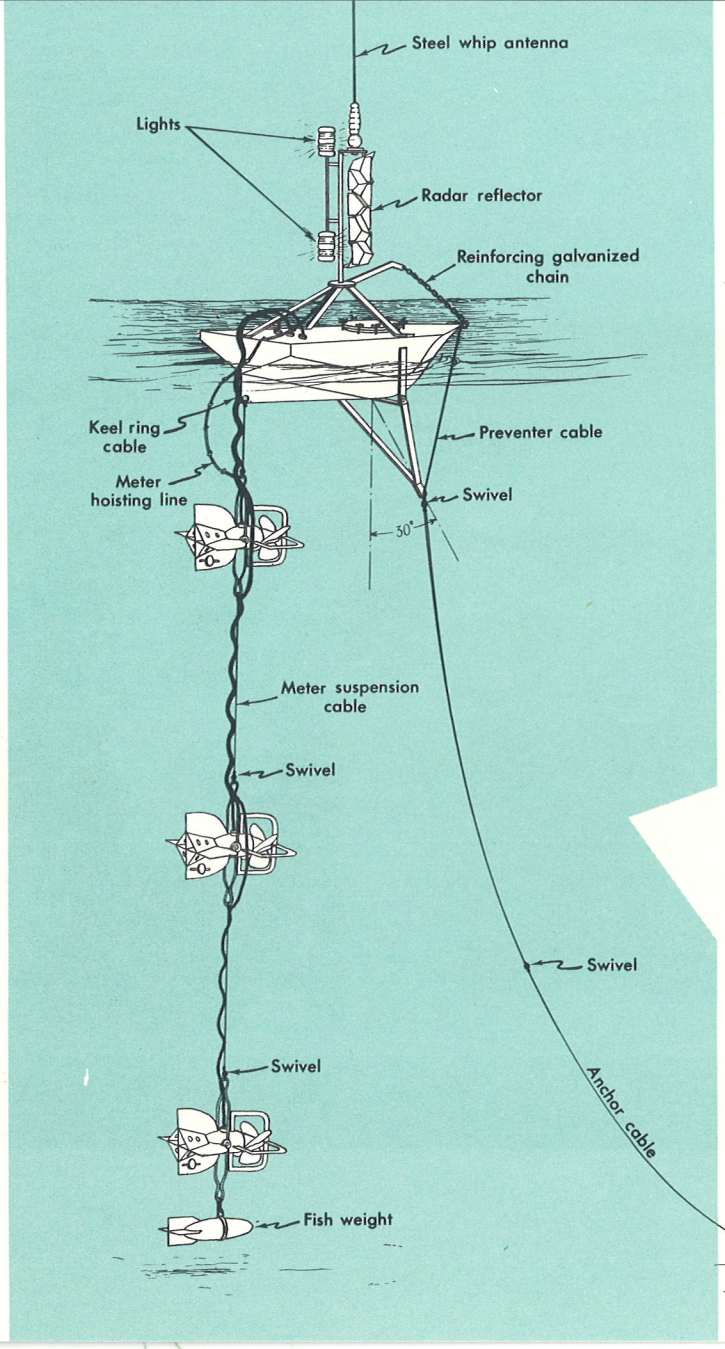
Attaching a Nansen bottle to a cable. Nansen bottles, named for the Norwegian explorer, are used to collect water samples.

We study tides, to reduce hydrographic soundings to a common datum, or standard.

The portable tide gage and staff measure the rise and fall of tides.

Portable Tide Gage at Point Chevreuil, La.



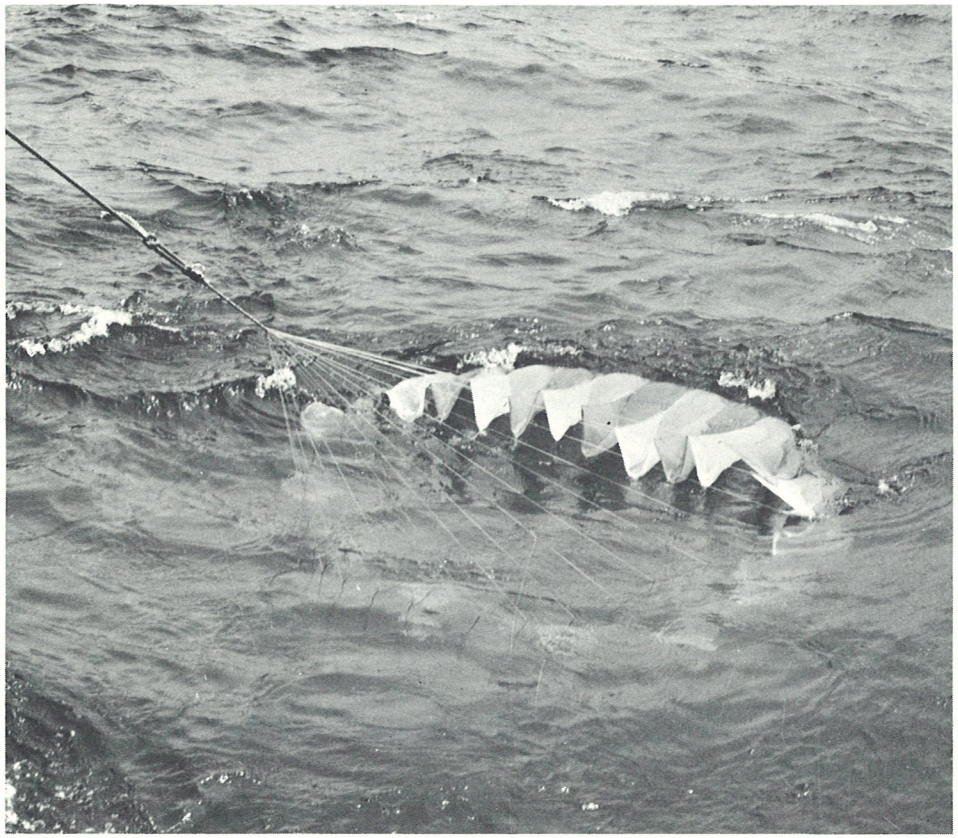


We measure ocean currents by several methods.

One is to use an anchored radio buoy from which several Roberts meters are suspended to gage the current at different levels.

CURRENT

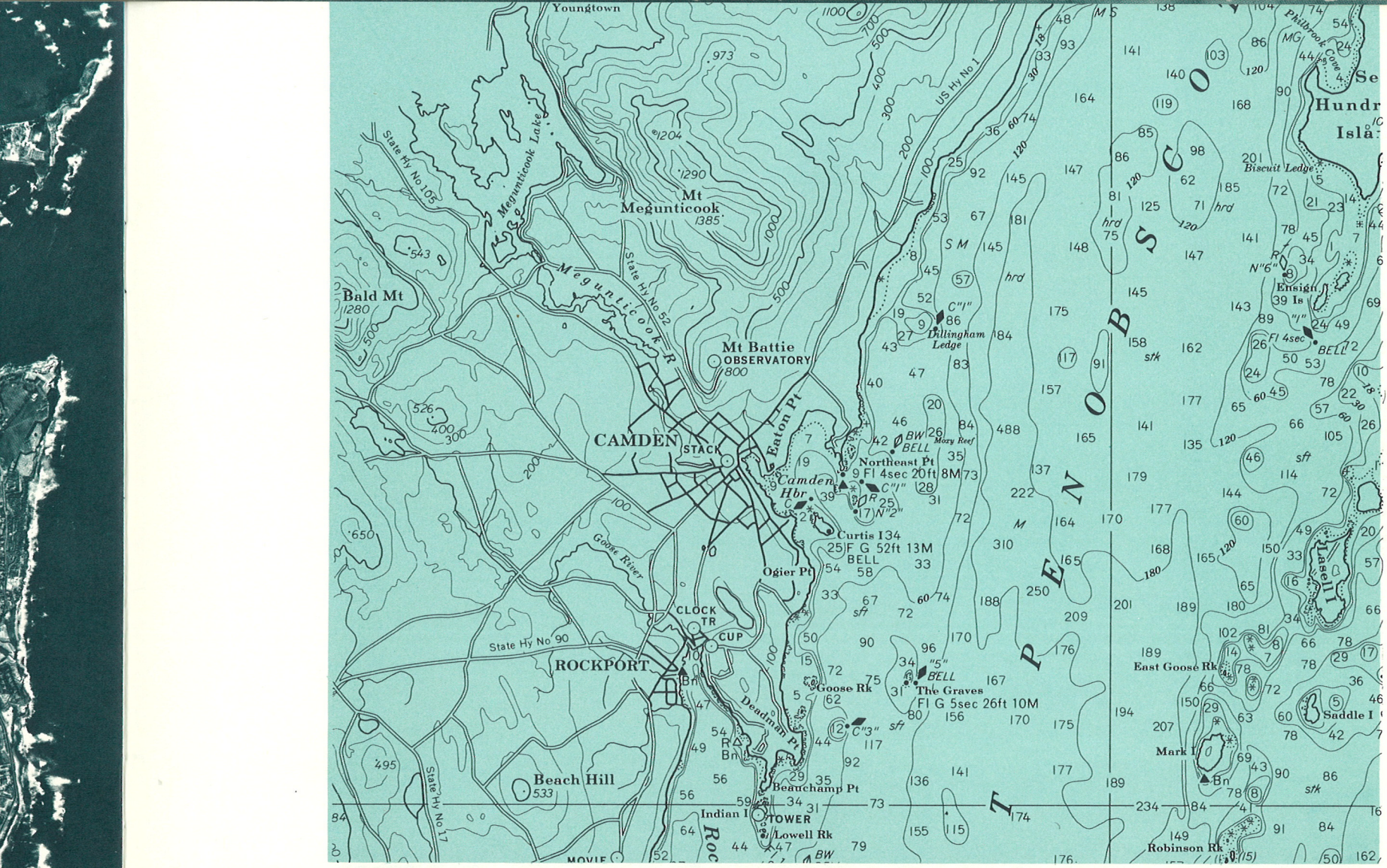
Another is to launch a radar marker buoy to which is attached a submerged current drogue, usually a surplus parachute.



A drogue being submerged. The buoy is pulled by the parachute and is tracked by radar for several days.

We use aerial photogrammetry to establish the location of shorelines.

An aerial photograph of harbor at San Juan, Puerto Rico. Flight altitude is 9,000 feet.



A printed nautical chart.

Note the hydrographic soundings, depth curves, and shoreline.

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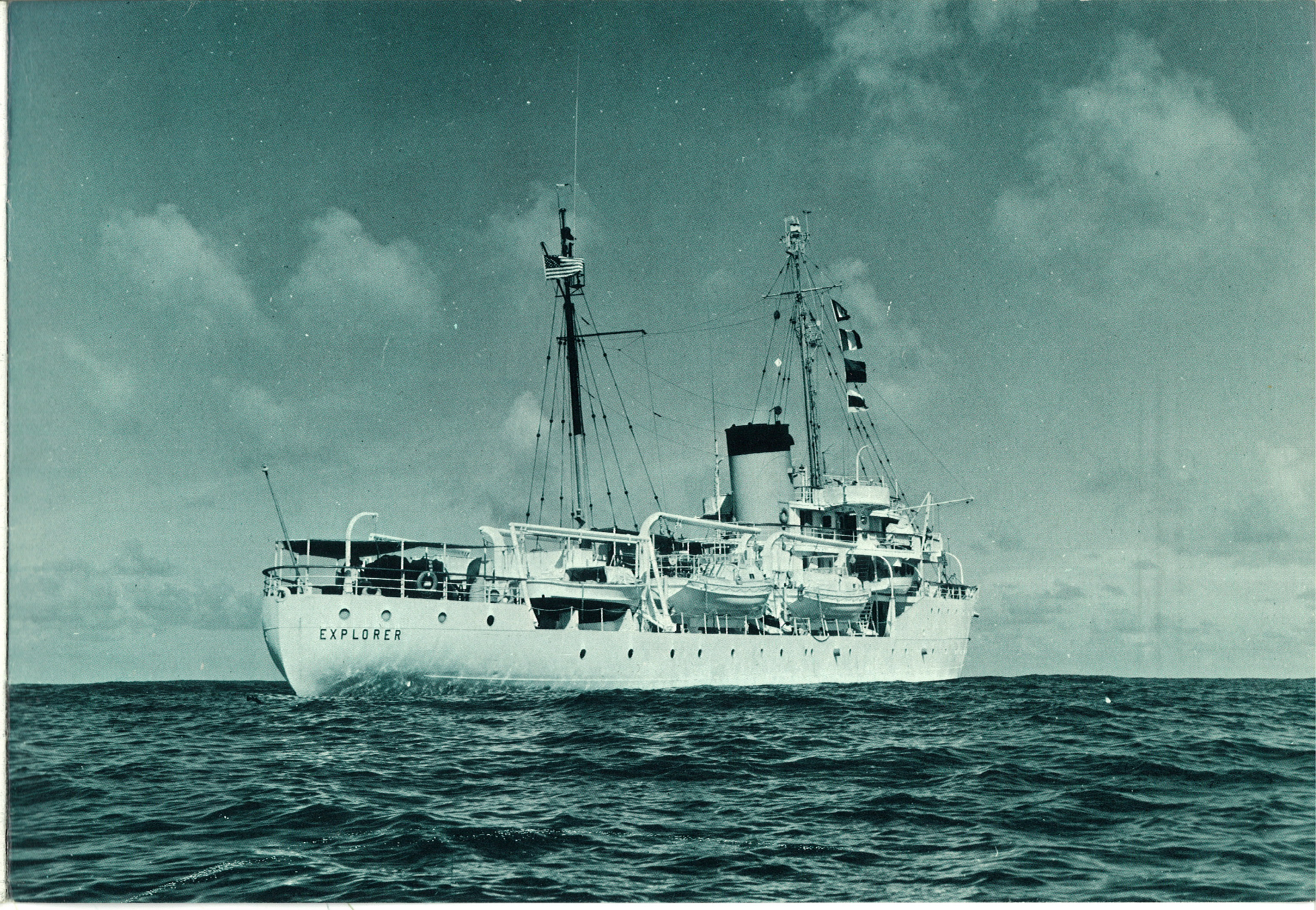


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